Is the Study of Medicine a Liberal Education?

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AMONG the Greeks, a temple was built and dedicated to Hippocrates; and in the Middle Ages, Ambroise Paré, was welcomed in a besieged city, as equal to a strong reinforcement by troops. But in modern times the pseudo-sciences and the various "pathies" have thrown discredit on medicine, while the admitted uncertainties of the art, have belittled the advances in the science of healing. It is, however, precisely here that we are justified in showing, the sharp contrast, with the modes of learning even fifty years ago; in claiming that medicine, as now studied, is a liberal education; and that a well-equipped medical school is equal to other institutions of learning.

The times have changed, and we with them, since the days of Dr. Samuel Johnson, when, he defined in his dictionary the humanities, as "philology, grammatical studies, *humaniores literæ*." Few would now claim for a purely classical education the name of a liberal one, to the exclusion of the study of the natural sciences. The immense debt of civilization to modern advances in technology, the adaptation of new laws and new forces in nature to our daily use and our daily needs, properly assert the right of purely scientific pursuits to be reckoned the equal of the humanities, which formerly were represented only by languages and literature. Yet modern medical study includes both the languages and science. Latin is interwoven with anatomy too intimately to be disentangled. Botany and pharmacy equally require a fair acquaintance with this

ancient tongue. Greek is more used in scientific nomenclature, and above all in the specialties of medicine, than in modern literature. German is indispensable to modern medical investigation; and so also is French. Ancient and modern languages, then, four in number, besides the vernacular, are required elements in a medical education to-day. In this respect the medical school is closely allied to the purely classical college. But even without this, we may justly claim that medicine, as now studied, requires an intimate knowledge of science, and also that the doctor, next to the naturalist, has the cultivation of his powers of observation carried higher than in any other profession. The *vexatio naturæ* of Bacon, the test of experiment, the clinical observation of disease, develop the highest faculties, and *are* a liberal education.

The study of medicine is wholly by *observation*. The practice (or art) of medicine is the result of *experiments*. Medical science is then strictly *inductive*. Theories of medicine may lead to *deductions*, often to false ones.

Let us attempt to define the terms observation, experiment, induction, deduction.

Observation: What we learn by using our senses; looking, hearing, touching, observing.

Experiment: The trial of anything; something done to discover an unknown effect.

Induction: To generalize from observation and experiment.

Deduction: A consequence from principles premised.

For example: Watt *observed* that boiling water turned to steam; that steam lifted the cover of a kettle; he *experimented* to see if it would move other objects; by *induction* he generalized the law of the expansion of steam. Theologists premise that God oversees the

world; they *deduce* from this premiss the principles of religion.

Says Mr. Buckle: "Science is the result of inquiry; theology is the result of faith. In the one, the spirit of doubt; in the other, the spirit of belief. In science, originality is the parent of discovery, and is therefore a merit; in theology, it is the parent of heresy, and therefore a crime. . . . The popular tendency of induction is obvious: for one person who can think, there are a hundred who can observe. . . . Facts seem to come home to every one, and are undeniable. Principles are not so obvious; and being often disputed, they have, to those who do not grasp them, an unreal and illusory appearance, which weakens their influence. Hence it is that inductive science, which always gives the first place to facts, is essentially popular, and has on its side those innumerable persons who will not listen to the more refined and subtle teaching of deductive science. Hence, too, we find historically, that the establishment of the modern inductive philosophy, with its varied and attractive experiments, its material appliances, and its constant appeal to the senses, has been intimately connected with the awakening of the public mind, and coincides with that spirit of inquiry, and with that love of liberty, which have been constantly advancing since the sixteenth century."

The novel, recent and enlarging use of instruments of precision, together with the progress in physiology and microscopy, have been the great factors in changing the whole scope of medical instruction. To summarize briefly what the medical student is supposed to learn in a four years' course, will make this plain.

The required course of the Harvard Medical School covered in 1870 about four months in each of three years, the same public lectures being repeated every year, so that the student could not follow a properly

graded course; the required course of the same school now covers nine months in each of three years, and the instruction is different in each year of the student's course. In addition, a voluntary fourth-year's course is maintained, and a great variety of instruction for graduates is given. All candidates for admission, except those who have passed an examination for admission to Harvard College, must present a degree in letters, science, or medicine, from a recognized college or scientific school, or pass an examination in the following subjects: —

(1) English. Every candidate will be required to write, legibly and correctly, an original English composition of not less than two hundred words, and also to write English prose from dictation.
(2) Latin. The translation of easy Latin prose.
(3) Physics. A competent knowledge of Physics (such as may be obtained from Balfour Stewart's "Elements of Physics").
(4) Elective Subject. Each candidate must pass an examination in any *one* of the following subjects: French, German, the Elements of Algebra or of Plane Geometry, Botany.

DIVISION OF STUDIES. FOUR YEARS' COURSE.

For the First Year. — Anatomy, Physiology, General Chemistry, Medical Chemistry and Materia Medica.
For the Second Year. — Practical and Topographical Anatomy, Medical Chemistry, Pathological Anatomy, Clinical Medicine, Surgery, Clinical Surgery, Therapeutics and Diseases of Children.
For the Third Year. — Obstetrics, Theory and Practice of Medicine, Clinical Medicine, Surgery and Clinical Surgery.
For the Fourth Year. — Ophthalmology, Otology, Dermatology, Laryngology, Mental Diseases, Diseases of the Nervous System, Gynæcology, Diseases of Children, Legal Medicine, Orthopedic Surgery, Genito-urinary Diseases, Hygiene, Vaccination, Bacteriology, Ovarian Tumors, Clinical Microscopy and the Preparation of Food for Infants and Invalids.

This course may be passed in three years, provided certain of the special studies of the fourth year are taken as electives.

To learn medicine, we begin to study: (1) chemistry, or the composition of inorganic and organic

bodies; (2) the dead man, healthy — or anatomy; (3) the dead man, sick — pathology; (4) the living man, healthy — physiology; (5) the living man, sick — clinical medicine. Many collateral sciences are also studied, as physics, botany and others.

Chemistry has revolutionized the arts of living; and it has equally revolutionized the practice of medicine. Bulky, inert or incompatible drugs have been resolved into the potent alkaloid, which is both cleanly and palatable. The chemical changes undergone by remedies in the complex laboratory of the human body have also been carefully studied. The fluids of the body have been analyzed. General chemistry and medical chemistry require long courses of months spent in the laboratory, before the student is permitted to advance to other branches.

Anatomy, that fascinating study of the structure and complex machinery of life, is studied on the dead body. No pursuit is more ennobling; none reveals more plainly the exquisite mechanics of living structures and the design of our Creator. So long, so labored, so minute have been dissections, that it has been said that anatomy was learned out, and there could be nothing new to discover. So far from this being true, the microscope has taken up and prolonged our search; and histology, or the study of tissues and cells, has opened up a new world of investigation. Anatomy is studied in our medical school, one entire year, half a second year, and there is a daily exercise in it for three and four years.

Pathology is anatomy altered by disease. While descriptive anatomy, or macroscopy, is now supplemented by microscopy, the gross outlines of the sculptor, by insight into the minutest tissues; so in pathology, this insight penetrates the deepest crypts of disease, maps out growths, describes cell-arrangement,

and in bacteriology pursues the parasitic germ to its home in the tissues and describes its habits and its *habitat*. Creative cellular forces are traced back in embryology to the protoplasm and the primal cleft.

From anatomy and pathology grows surgery. And who can measure the future of modern surgery, except by contrast with its vast advance in the last twenty years? The germ theory of disease and the use of germicides or antiseptics have changed suppurations to painless healings, banished many *opprobria* and failures of operations; and, together with anæsthesia, have rendered the surgeon bold, accurate and safe in many novel operations on the abdomen, the viscera, and the brain. The surgical field thus enlarged; the focus of surgical observation brought down to infinitesimal minuteness; counting blood globules; estimating white cells; resolving baccilli, — all this has to be learned, and learned by observation and practice, in a modern medical education.

Physiology, the science of nature, or of life rather — the knowledge of function, of use, of habit; in health, in disease — has also been developed almost as fast as the knowledge of physics has been enlarged in physical laboratories. Experiment is the path of physiology; along this path she moves steadily upward; and by experiments on lower animals, medical practice is most rapidly advanced. No one unfamiliar with it can realize the extent of the appliances and details of a modern physiological laboratory. Here, then, the medical student has a vast field of study.

Just as the great artist must study and copy the human face and form as his most difficult lesson, if he would excel in any department of painting, so man offers to the medical observer the most complex and least scrutable problem. He lives, grows, decays, revives, assimilates, excretes, gains, wastes, — all at the

same time. Cells travel, reside, procreate, develop, decay, form healthy or diseased tissues, side by side. Chemical interchanges, vital forces, nervous influences, all combine in life. Mental processes influence bodily ones; and all these are to be weighed, counted, balanced, measured, in estimating the health or the sickness of the individual. The trained eye, the educated ear, the erudite touch, must all be guided by prolonged clinical experience, to constitute the medical observer, the true physician. It is in our great hospitals and dispensaries that this highest educing of the faculties must be practised by the medical student.

Modern science has offered to the observer numerous instruments of precision to guide his observation. The clinical thermometer is the safety-dial of diagnosis. The stethoscope magnifies the sounds of the heart and lungs, and makes plain slight vibrations otherwise inaudible or unnoticed. The ophthalmoscope illuminates the bottom of the eye and the retina. The laryngoscope reveals the vocal chords; the endoscope numerous cavities, which are also made visible by the electric light. The microscope extends the natural eye of the observer to the cellular basis of all the tissues. Synthetic chemistry compounds the excreta of bacilli to arrest the progress of the germs themselves.

If we add to all this the tendency in medicine, as in all pursuits, to specialize, we may realize how every field must be magnified by minute research.

Besides, medical studies form close partnerships with the law, in medico-legal questions, and in sifting crimes. The analysis of poisons, the recognition of blood, the determination of the time and the cause of death, the weighing of accountability, the estimation of mental competency, — all are settled by the medical expert.

In the noblest field of all, preventive medicine, in

hygiene modern medical education is making the greatest progress. To cleanse milk of tubercle bacilli, to detect filariæ, to dispose safely of drainage, to purify water, are the pressing scientific as well as practical problems always testing the knowledge and the keenness of the medical observer.

Just as colleges, as they broaden, aspire to give advanced instruction, so, also, the medical school is providing post-graduate and advanced courses for original research, and for specialized study.

The treatment of disease has always been considered the highest attribute of the physician. In this department all his previously acquired knowledge is grouped, classified, utilized. No vaunted specific is left untried; the earth is ransacked for remedies; and they are all tested by experiment.

Can we deny, then, to the study of medicine its place among the noble sisterhood of the sciences of civilization? Her present methods no more resemble older ones, than the steamship or the electric light of to-day, resemble the galley of the Roman or the *lucerna* of Pompeii. What can be a more liberal education than drawing out the faculties of observation, learning by experience, comparing and generalizing by induction, as we do in the medical school; but demanding, as a prerequisite, a knowledge of English, of Latin, of physics, either German or French, and some mathematics; and considering, as best of all, a preliminary mixed, classical and scientific, academic course and degree?

To accomplish all this, to preserve health and youth, to render it within the means of parents and boys to get a complete medical education, it is essential that the doctor should not start in the race of life too heavily weighted by years. What are the present facts? How early, or how late rather, can a sound academic and professional education be attained?

"As matters now stand, one-half of the students who enter Harvard College — that half, namely, who become ministers, lawyers, or physicians — enter, on the average, at nineteen, take the degree of Bachelor of Arts at twenty-two and three-quarters, and complete their training for the learned professions at twenty-five and three-quarters or twenty-six and three-quarters years. In the opinion of the majority of the Faculty these ages are all unreasonably high." [1]

Seven or eight years are now required to get an A.B. and an M.D. degree. Both are valuable. Can they not be combined? The plan proposed by the Harvard Medical School, was to have the scientific and elementary medical studies, as chemistry, anatomy, physiology, and perhaps botany, made electives for the senior year at Cambridge; so that the junior who had decided on medicine as his life-pursuit, could select in his last or senior year at Cambridge, studies which led him directly to his profession. Three years in the Medical School would then count as four, and he would graduate an M.D., one year younger than by the present method. This method, when reduced to its simplest terms, consists in counting certain agreed-upon courses of professional instruction both for the degree of Bachelor of Arts and for the professional degree.

In the words of the majority report of the Faculty: "They can find no warrant in the educational history of older nations for the American practice of holding the best educated young men back from professional study until they are twenty-three years of age, or more. Thus, at Oxford and Cambridge, professional studies may be counted to a large extent for the A.B.; the German youth leaves the gymnasium at from nineteen to twenty years of age on the average, and at once is free to begin in the university his preparation

[1] Report of a majority of the Faculty of Harvard College.

for some learned profession; the French boy is even younger when he chooses a career and begins professional study."

The Edinburgh University has just lengthened its medical curriculum to five years; but the average age of the matriculating medical student is nineteen years. It is a singular anomaly, that in America the well-educated doctor must start later in the competition race for a living, than in older communities.

The objections made in the report of the majority of the College Faculty are fallacious. They are practically these: that this proposed method "abolishes the fundamental distinction between liberal and professional studies: . . . confounds all distinction between pure and applied science." What are liberal studies? Must we confine ourselves to-day to the *humaniores literæ?* Is induction liberal? Shall we go back to the period of learning before Bacon? What is pure science? Is chemistry pure, as well as applied? Are not anatomy and physiology as liberal as geology, physical geography, zoology, physics?